

Summary

The prevalence of diseases related with disorders of the immune system, pose a serious problem in dairy cattle farming. Recently, in order to improve the functioning of the immune system, the attention has been drawn to the application of probiotics. However, the administration of probiotics and its effect on the immune system of dairy cows and calves, is not well understood. Most of publications, which are mostly review-ones, only confirm that probiotics have a stimulant effect on the immunity of this animal species. Therefore, the purpose of the conducted research was to investigate the impact of probiotics, applied as a nutritional-supplements, on selected indicators of the immune system of dairy cows in different lactation periods, and its influence on the immune-system of their descendants. Moreover, the experiment was also carried out to evaluate the impact of probiotic consumption on the immune system of offspring, which mothers were supplemented with probiotics during the last six weeks of their pregnancy (whole dry period).

The first step of the research was conducted on twenty pregnant cows. The animals were divided into two groups, of 10 cows each. The experimental group was represented by cows, which were fed with the addition of the “EM-Probiotyky” probiotic as a nutritional supplement, from the day of selection of each animal as a subject of the research before the dry period, up to twelve weeks after the parturition (90 DPP). The cows, which were not supplemented with probiotics, were observed as the control group. In the second step, twenty calves, descendants of the above-mentioned ones, were included in the experiment. The experimental group was consisted by ten calves, the offspring of cows which were representing the previously mentioned, experimental group. The animals included in this group also received the “EM-Probiotyky” with their feeds, from third, till the one-hundredth day of life, while calves which were the descendants of cows from the “Control Group”, determined the “Control Group” as well. There was no administration of probiotics in the feeds in this group of animals. The blood needed for the research was drawn six times. First time in the day of selection of the individuals to the experiment – before the dry period. Second time - 14 days before the parturition, then 7, 21, 60, 90 days after the parturition. The blood was obtained from the calves 48 hours after the birth, then 21, 60 and 120 days after. The phagocytic activity of granulocytes and monocytes was evaluated by the flow cytometry method with the use of the “Phagotest” commercial test kit. Immunophenotyping of the lymphocytes was done by using the flow cytometry as well. To examine the intracellular ability of killing of the neutrophils, the Bursttest test kit was employed. In all animals which

were taking part in the experiment, the following receptors were tested: CD 4 (T helper cells (TH)), CD 8 (T cytotoxic/suppressor cells), CD11b (integrin receptor subunit α M), CD 18 (integrin receptor subunit β 2), CD21 (lymphocytes B), CD25 (interleukin receptor alpha chain 2) and Foxp3 (T-regulatory cells). The measurements of the level of the serum amyloid A (SAA) in the blood serum of cows, were carried out using a commercial ELISA kit. The results showed an increase of the phagocytic activity and intracellular killing of phagocytic cells in the peripheral blood of cows after the use of probiotics in the first step of our own research. What's more, a percentage increase of Foxp3 lymphocytes, TCD4+ helper lymphocytes, activated BCD25+ lymphocytes, β 2 (CD18+) and α M (CD11b+) integrins was also observed in this group of animals. The increase of the activity of the phagocytes and above - mentioned changes in the leukocyte subpopulations are probably the results of the activation of the regulatory processes in the immune system of cows which were fed with the addition of the probiotics, which enabled the simultaneous use of both cellular and humoral mechanisms of the immune – response. Because of that, a conclusion can be drawn - after the administration of probiotics, appropriate and necessary to eliminate a possible danger, and to stabilize the immune system mechanisms are activated, what can be confirmed by the fact that in bodies of the cows which were receiving the probiotic, the level of serum amyloid A (SAA) was persistently low throughout the whole experiment. Therefore, it can be assumed that the immune system of cows fed with an addition of the probiotics was better prepared to react in the event of a possible danger and more easily adapted to changes of conditions in different periods of lactation, especially in the postpartum period. Thanks to it, the application of probiotics, especially during the dry period and early lactation, can reduce the occurrence of infectious diseases in dairy cows. Own researches also show, that the use of probiotics in nutrition of dairy cows during their pregnancy has a stimulating effect on the immune system of their offspring. Similarly, calves which received a probiotic after the birth, had a significantly higher percentage of TCD4+ lymphocytes, BCD21+ lymphocytes, activated BCD25+ lymphocytes and β 2 (CD18+) and α M (CD11b+) integrins, compared to the calves of the control group. Based on these results, it can be concluded that the immune system of calves from the experimental group adapts faster, perhaps because of the probiotic supplementation. Whereas, given that the percentage of Foxp3 lymphocytes was very low, the regulatory processes practically did not function in calves of both groups for the entire duration of the experiment.

Key words: dairy cows, calves, probiotics, cellular immunity.